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ABSTRACT

The objective of this study was to evaluate the effect of an alcohol misuse prevention program on drinking behavior and alcohol-related problems among United States Marine Corps personnel. A total of 567 men from two Marine Corps infantry battalions participated in the evaluation in which members of one battalion received an alcohol misuse prevention program, while members of the second battalion served as controls. The program consisted of targeted, small-group training sessions, with corporals and sergeants training their subordinates. Subjects completed questionnaires on alcohol use behavior at baseline and at 3- and 6-months postintervention. Alcohol-related legal incidents, alcohol abuse counseling referrals, and other outcomes were measured in aggregate. This study found that there was a greater decrease in the percentage of some self-reported alcohol-related problems, including serious consequences resulting from alcohol and specifically in the inability to remember things that happened while drinking, not being able to stop drinking, and getting drunk from alcohol among the intervention group compared with the control group. There was a small decrease in the number of drinks per day at the 3-month follow-up and in the rate of counseling referrals among the intervention group. No differences were observed in the Alcohol Use Disorders Identification Test score, drinking days per month, or in the other outcomes. The results suggest that the alcohol reduction training program did not have a significant overall effect on drinking behavior, however, the program may have prompted a short-term decrease in drinking and affected some alcohol-related problems.

Alcohol use in the military has substantially declined over the past 20 years. However, heavy alcohol use, defined as 5 or more drinks per occasion at least once per week, was at roughly the same level in 1998 as it was in 1980 [1]. The percentage of heavy drinkers in the United States Marine Corps was 23% in 1998, the highest among all of the military services [2]. The 1998 Department of Defense survey reported that among male Marines aged 18-25 years, the percentage of heavy drinkers was 31%, about double the percentage seen among civilians in the same age group [1]. Findings from the representative Department of Defense survey also indicated that the percentage of Marine Corps personnel in the lower pay grades (i.e., private, private first class, and lance corporal) who experienced one or more serious consequences due to alcohol use was 21% in 1998. An alarming 25% reported losses in work productivity due to alcohol use [1]. Other problems related to heavy drinking in the military include unintentional injuries, suicide, and homicide [3-6]. Heavy alcohol use damages military readiness by decreasing reaction times, visual sensitivity, and efficiency.

The U.S. Marine Corps began an alcohol misuse prevention and deglamourization campaign in 1997 emphasizing the Marine Corps' commitment to preventing alcohol misuse, that heavy drinking is not a healthy lifestyle, and the need for culture change to decrease alcohol misuse throughout the Corps. Specific components of the campaign included policy changes, modification to clubs, increased command accountability, and unit-level education programs. Leadership personnel identified that alcohol misuse education programs in use prior to this campaign were inadequate and ineffective, especially at the unit level.

As part of this campaign, a cognitive-behavioral alcohol misuse prevention program for Marines was developed by the Naval Health Research Center to reduce

heavy drinking and alcohol-related problems. The program was based on successful brief interventions developed for college students [8-11, 17], as well as successful adolescent prevention models. The program was designed to challenge Marines to examine their own drinking behavior and seek solutions to reduce rates of use and risk. In addition, the program sought to encourage unit leaders to be more active in monitoring and reducing risks within their units. This behavioral change program was to be implemented in small, interactive groups led by unit leaders. The objective of this study was to evaluate the effect of the alcohol misuse prevention program on drinking behavior and alcohol-related problems among Marine Corps personnel.

METHODS

Target Population and Procedures

The target population for this study was Marine Corps personnel in the Unit Deployment Program from two infantry battalions who were preparing to depart to Okinawa, Japan, for 6 months during 1998-1999. Two other battalions were also selected but were dropped from the study because their operational commitments made their participation unreliable. All members of the participating battalions were administered an anonymous, paper-and-pencil baseline questionnaire in a group setting before going on deployment. To evaluate the effect of an alcohol use reduction program, one battalion received the training before their deployment while the other battalion served as the control group. A follow-up questionnaire was administered to all available battalion members during the third and sixth month of their time in Okinawa. In addition, alcohol-related outcome measures (described below) were gathered in aggregate form from the battalions over the course of their deployments.

Intervention

The intervention, called the Battalion Alcohol Skills Intervention Curriculum, is an alcohol use reduction training program for Marines. This program is based on work originally developed by researchers at the University of Washington for heavy-drinking college students [7]. Their alcohol skills training program was shown to reduce problematic drinking [8, 9] and a modified program was further tested with high-risk drinkers and was found to significantly reduce alcohol-related problems [10, 11]. The intervention for the present study was tailored for Marines through extensive meetings and trials with Marine Corps enlisted personnel and officers, substance abuse counselors, and experts in the field of substance abuse. The program uses a multi-method approach incorporating skills-building, self-management principles, information sharing, small group discussions, exercises, drunk simulation goggles, and a 17-minute, Marine-specific, motivational videotape created for this program. The program teaches participants to examine their own drinking and compare their level with service averages, while reviewing how alcohol affects the body, the importance of blood alcohol level, tolerance, monitoring alcohol use, monetary costs of drinking, personal expectations and beliefs about drinking, setting personal drinking limits, and risk reduction. In addition, participants are taught how to effectively lead the training sessions for their junior enlisted men, teaching them specific information on how to guide the groups, handle resistance, and to use the information on an ongoing basis with their units.

The training program has separate modules tailored for three primary target groups: junior enlisted Marines (E1-E3); unit leaders, or noncommissioned officers, called NCOs, (E4-E5); and senior enlisted personnel (E6-E9) and officers. The unit

leaders were viewed as critical links in an alcohol reduction campaign targeted at their juniors because they are the immediate source of leadership, influence, norms, rewards, and punishments for the slightly younger Marines in their units. The NCO training consisted of three 90-minute sessions over a 2-week period. The E1-E3 program was then taught by the E4 and E5s in two 90-minute weekly sessions, in small groups of 10-12 Marines. The program also included six 60-minute booster sessions to strengthen the concepts and skills already learned. Senior enlisted personnel (E6-E9) and officers received a single 90-minute training session, which included an overview of the entire intervention program, facts about Marine Corps alcohol use and effects, emphasis on core values, senior leadership and support, and setting the example and tone for alcohol use.

Questionnaire Measures

The questionnaire assessed self-reported drinking behavior, alcohol-related problems, and demographics. Included in the questionnaire was the Alcohol Use Disorders Identification Test (AUDIT), which has been recommended for use among enlisted men in the armed forces [13, 14]. This scale measures the quantity and frequency of alcohol use, as well as alcohol dependence and alcohol-related problems. In addition, self-reported alcohol-related problems were measured in the baseline and 6-month surveys related to three areas: serious consequences, productivity loss, and other alcohol-related problems. A serious consequence was defined as reporting the occurrence of 1 or more of the following problems related to alcohol use in the prior 6 months: Uniform Code of Military Justice punishment; loss of 1 week or more from duty because of an illness; injury; spouse left; arrests for driving while impaired or other incidents; time in jail, stockade, or brig; fights; not getting promoted; and needing alcohol detoxification.

Productivity loss was defined as reporting one or more work days on which any of the following activities occurred due to alcohol use in the prior 6 months: being late for work or leaving early; not coming to work at all; being drunk at work; or performing below a normal level of productivity. Other alcohol-related problems that were measured included the occurrence in the prior 6 months of hands shaking, inability to remember things that happened while drinking, inability to stop drinking before becoming drunk, being nauseated, morning drinking, hitting someone in a fight, and getting very drunk. A heavy drinking category was computed based on the definition of 5 or more drinks per occasion at least once per week, used in previous Department of Defense reports on alcohol use [1, 12].

Additional Outcomes

Several measures were collected in aggregate to assess alcohol-related negative consequences in the study groups. The number of referrals for alcohol abuse treatment was collected from baseline through the 6-month follow-up period from each battalion's Substance Abuse Counseling Center. In addition, monthly data on alcohol-related legal incidents for the battalions during the study period were obtained from the Provost Marshall Office computer system in which all police actions on the base were logged. Blood alcohol concentration (BAC) was collected in two settings. First, subjects gave a breath sample at each medical visit to the Battalion Aid Station or Branch Medical Clinic. A corpsman trained in the use of the BAC machine reminded subjects of the confidentiality of their sample and asked them to blow into the handheld machine prior to receiving care. Secondly, two unannounced, random breath tests were given in the early

morning to a randomly selected sample of Marines from each battalion at their barracks at approximately 1 and 5 months into their deployment.

Data Analysis

Independent *t* tests, χ^2 statistics, and analyses of variance (ANOVAs) were used to test for differences in demographics and other variables of interest between the control and intervention group and characteristics of responders compared to non-responders. Repeated-measures ANOVAs were performed to examine the effectiveness of the program over the study period. Alcohol use and related variables measured at three times (i.e., baseline, 3-month follow-up, and 6-month follow-up) served as the within-subjects factor, and group (i.e., intervention or control group) served as the between-subjects factor. χ^2 tests were used to examine differences among groups and over time for categorical data. Rates for alcohol-related legal events and substance abuse counseling referrals were calculated by dividing the number of occurrences by the total person-months for the study period for each battalion. Total person-months were calculated using the on-site time recorded in a battalion location log and battalion strength information. The difference in alcohol-related problem rates among the groups was tested using the density ratio (DR) and 95% confidence interval (CI).

RESULTS

Sample

The initial sample had 666 participants from one battalion that was designated as the intervention group and 646 participants from a second battalion, designated as the control group for a total of 1,312 participants at baseline. The sample represented all

available personnel at the time of survey administration. The 3-month participation rate was 72% for the control group and 31% for the intervention group. There was a significant difference in the response rate between the intervention and control groups because a large portion of the intervention group's 3-month follow-up surveys were inadvertently damaged during the mail handling and were unusable. The 6-month participation rate was 63% for the control group and 24% for the intervention group, resulting in a 43% overall follow-up response rate (total $n = 567$ respondents from 1,312 eligible; control group $n = 409$; intervention group $n = 158$).

As shown in Table 1, the mean age of participants was 22.5 years old, the median pay grade was E3, and all of the participants were male, because women were not included in the battalion's Unit Deployment Program. The majority of participants had at least a high school education, and were single. There were no significant differences in demographic characteristics, baseline drinks per day, or in other baseline variables of interest between the intervention and control groups.

To test whether baseline characteristics for non-responders and those participants remaining in the study differed by group, 2-way ANOVAs (i.e., attrition status by group) were conducted. These analyses indicated that attrition was generally comparable for the two groups with regard to demographics (age, pay grade, and education) and baseline drinking levels (drinks per day and days drink per month); however, across study groups dropouts tended to be slightly lower in pay grade and have a higher AUDIT score.

-Insert Table 1 here-

Alcohol-Related Problems

Table 2 shows the percentage of participants who reported experiencing alcohol-related problems at baseline and follow-up as well as the proportion of change between the two points in time. Of the 5 items that differed significantly in the proportion of change from baseline to 6-month follow-up between the control and intervention group, 4 items (inability to remember things that happened while drinking, couldn't stop drinking before becoming drunk, got drunk from alcohol, and serious consequences resulting from alcohol) showed greater change in the intervention group.

-Insert Table 2 here-

Quantity and Frequency of Drinking

Repeated-measures analysis of variance tests indicated that there was a significant group (intervention, control) by time (baseline, 3-month follow-up) interaction effect for average drinks per day, $F(1,518) = 6.03, p = .014$ (Figure 1). The intervention group showed a small decrease in drinks per day from 5.84 ($SD = 3.06$) drinks per day at baseline to 5.22 ($SD = 2.87$) drinks per day at the 3-month follow-up, while respective values for the control group were 5.54 ($SD = 3.09$) and 5.65 ($SD = 2.96$). Significant differences in drinks per day were not maintained at the 6-month follow-up.

-Insert Figure 1 here-

Similar analysis performed on the number of days per month that participants drank revealed no significant group by time interaction, $F(1,545) = 0.10, p = .755$. The intervention group decreased from 6.12 ($SD = 4.75$) days per month at baseline to 4.19

(SD = 4.57) days per month at the 3-month follow-up, while respective values for the control group were 6.68 (SD = 5.49) and 4.92 (SD = 4.72).

In both groups, the percentage of participants classified as heavy drinkers decreased over the study period (51% at baseline and 37% at 3 months for the intervention group and 46% at baseline and 36% at 3 months for the control group, $p >$ .05). Because there was a large percentage of participants drinking 5 or more drinks per occasion, additional analyses were performed on cases where the participants reported that they drank 6 or more drinks per occasion and 7 or more drinks per occasion. There was a significant difference in the percentage of heavy drinkers between groups over time among those who drank 7 or more drinks per occasion ($\chi^2 = 5.89, p = .01$), with the intervention group showing a decrease from 39% heavy drinkers at baseline to 23% at the 3-month follow-up, while respective percentages for the control group were 37% and 26%.

The mean AUDIT value was 8.7 (SD = 5.5) at baseline and 7.2 (SD = 5.7) at the 3-month follow-up for the intervention group and 9.3 (SD = 6.3) at baseline and 8.3 (SD = 5.8) at the 3-month follow-up for the control group, $F(1,507) = 0.83, p = .363$. While there was a larger decrease in the AUDIT score for the intervention group compared with the control group, the difference was not significant.

Alcohol-Related Outcomes

The monthly rate of referrals for substance abuse counseling was 0.006 referrals per person for the intervention group and 0.022 for the control group. Density ratios indicated that the rate of referrals was significantly lower in the intervention group compared with the control group (DR = 3.67, 95% CI = 2.20, 7.61). There was no

significant difference between groups in the monthly rate of alcohol-related legal incidents, with the intervention group reporting 0.005 incidents per person and 0.002 for the control group ($p > .05$). Members of the intervention group were given 920 valid BAC tests, of which 19 (2.0%) were positive for blood alcohol. Similarly, out of 910 tests given to the control group, 19 (2.0%) were positive for blood alcohol, indicating no difference in the percentage of positive BAC tests among the groups ($p > .05$).

DISCUSSION

The objective of this study was to evaluate an alcohol misuse prevention program among Marine Corps personnel using a repeated-measures, control group design. The program was implemented in the field, and a variety of self-report and outcome measures were collected. This study found that there was a greater decrease in the percentage of some alcohol-related problems, including inability to remember things that happened while drinking, not being able to stop drinking before becoming drunk, getting drunk from alcohol, and experiencing serious consequences resulting from alcohol. In addition, there was a small, significant decrease in the number of drinks per day at a 3-month follow-up and in the rate of substance abuse counseling referrals among a group that received the alcohol reduction training compared with a control group. No differences were observed in the AUDIT score, drinking days per month, percentage of heavy drinkers drinking 5 or more drinks per occasion at least once per week, or in the other objective measures collected. In summary, the results suggest that the alcohol reduction training program did not have a significant overall effect on drinking behavior, however, the program may have prompted a short-term decrease in drinking and affected some alcohol-related problems.

There were several interesting findings in this study that are noteworthy. The finding that the intervention group had fewer alcohol abuse counseling referrals and that there was a greater decrease in the percentage of Marines drinking 7 or more drinks per occasion in the intervention group suggests that the intervention had some effect on harmful drinking in relation to the severity of the quantities of alcohol consumed. The results also show that there was a reduction in some alcohol-related problems. The intervention group had significantly less serious consequences resulting from alcohol and specifically less occurrences of inability to remember things that happened while drinking, getting drunk from alcohol, and fewer incidences of being unable to refrain from consuming alcohol prior to becoming drunk. While these reductions in self-reported alcohol-related problems were not supported by parallel reductions in legal incidents, they indicate a decrease in unit-level serious consequences and should not be underestimated. In addition, the finding that there was a small reduction in the number of drinks per day and no change in the number of drinking days per month suggests that although the Marines' frequency of drinking was not affected, their quantity per drinking occasion decreased, thus resulting in a decrease in overall monthly alcohol intake.

The reduction found in drinks per day was not maintained at the 6-month follow-up. This is likely related to the inconsistent manner in which the booster sessions were implemented. Improved mechanisms to provide such refreshers that are brief and do not require time away from the population's primary missions are suggested to increase the longevity of any effect.

This study did not find a significant decrease in the AUDIT score. However, it is noteworthy that the mean overall baseline AUDIT score was 9.3, above the standard

cutoff value of 8, indicating hazardous and harmful drinking [14]. Future research might focus on the interpretation of varying degrees of severity among the high scorers [15].

The strengths of this study include the use of several objective measures of alcohol-related problems in addition to surveys and a field evaluation with a panel of Marine Corps personnel. This study successfully positioned a population-based alcohol misuse prevention program in a specialized community with a high level of responsibility and self-sufficiency, utilizing the existing leadership structure.

The main shortcoming of the study is the high loss to follow-up in the intervention group, yielding a follow-up rate below the usual standard [16]. While other prevention program evaluations have experienced similar difficulties with low follow-up rates, the low rate encountered in the present study is primarily due to the logistics error that occurred and is not due in large part to participant refusal to provide the data. The study findings should be interpreted with caution due to this limitation, and be considered limited to individuals who were more likely to be retained in a study such as this.

In addition, it was not feasible during this study to obtain measures of the fidelity with which the unit leaders conducted their training of their junior Marines. While they received standard training in how to teach the program, the training sessions they taught their junior Marines were conducted during the predeployment phase, which is a period when schedules are hectic. There may have been temptation during this period to focus on merely getting through the training rather than to emphasize completing it properly. Future research would need to include some incentive for increasing the likelihood that training is conducted according to design and should include solid process measures.

Several environmental changes occurred during the course of the study over which researchers had no control that most likely had an effect on the alcohol-related

behaviors of both the intervention and control group. The overall decreases in alcohol use are most likely explained by the Marine Corps-wide alcohol deglamourization campaign and new Marine Corps alcohol use policy that was implemented during the study in Okinawa. Examples of the major changes to the alcohol policy were that the legal drinking age was moved to 21 from 20 years of age, and E3s and below living on base were limited to having a maximum of 6 beers or wine coolers in their room rather than 12. These tighter restrictions on alcohol may have made access to alcohol more difficult and may have pushed alcohol sales off base where we were not able to measure them. The campaign may also have had the effect of altering the command climate of the battalions such that both the intervention and control groups were subjected to higher command awareness and closer monitoring of alcohol-related events.

The lack of preintervention, historical measures of alcohol-related legal incidents, substance abuse counseling referrals, alcohol sales, and BAC tests is a limiting factor. Although differences in rates were compared between the battalions during the deployment, it was not known if these rates were higher or lower than the rates of alcohol-related problems before the intervention was implemented.

Another important issue for future research that emerges from this field study is the importance of the level of command involvement and support. Factors such as command climate, command support for the implementation of the training program, and discretion in how alcohol-related incidents were handled may have had an effect on the intervention implementation and on the way in which alcohol-related incident data were recorded. For example, alcohol-related problems that might have been handled at the lowest level in one battalion may have been routinely brought up the chain and referred for counseling or punitive action in another battalion. Future evaluations of similar

interventions regarding alcohol use and related sensitive issues should include a significant emphasis on command support and climate.

Strong leadership support and alcohol deglamourization campaigns are an important part of an overall strategy to reduce alcohol misuse. In fact, broad-based approaches with educational, social, and environmental components are recognized to be the most promising strategy [17, 18]. In the present study, the educational program was designed to be only one part of a comprehensive alcohol control strategy that emphasizes both the individual's reduction of drinking and environmental components such as the promotion of alcohol-free alternative activities and reducing access to alcohol. The overall framework for this plan includes four components: education and monitoring, promotion of alternatives and deglamourization of alcohol, alcohol-alternative activities, and accessibility. Other communities with populations with high percentages of heavy drinkers, for example college campuses, are also applying a variety of methods to reduce binge drinking including education, targeting high-risk groups, increasing alternative activities, and reducing the availability of alcohol [17]. However, even with increased broad prevention efforts, change in heavy drinking behavior in a population is a long-term process [19].

The findings from this study suggest that the training had a small effect on alcohol use and alcohol-related problems. Additional research is needed to test whether modifications to the program, increased leadership emphasis and support, and enhanced training implementation would improve the effectiveness. The alcohol misuse prevention program evaluated in this study shows potential for having an impact on individual alcohol use behavior and may serve as one component in an overall strategy to reduce alcohol misuse and related consequences among Marine Corps personnel.

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Table 1. Demographic Characteristics of Participants in the Battalion Alcohol Skills Intervention Curriculum Evaluation, 1998-1999

Characteristic	Control Group (n = 409)	Intervention Group (n = 158)	Overall (N = 567)	χ^2 or t	p
Age in years [mean (*SD*)]	22.7 (4.5)	22.0 (3.2)	22.5 (4.2)	3.52	0.061
Range	17-46	17-38	17-46		
Education (%)				0.77	0.678
<High school	1.2	1.3	1.2		
High school	73.3	69.6	72.3		
> High school	25.5	29.1	26.5		
Gender (%)					
Male	-	-	100.0		
Pay grade (%)				4.60	0.204
E1-E3	57.6	65.2	59.7		
E4-E5	30.6	28.5	30.0		
E6-E9	6.4	3.2	5.5		
Officers	5.4	3.2	4.8		
Marital Status (%)				2.38	0.304
Single	71.1	67.1	70.0		
Married	26.7	28.5	27.2		
Other	2.2	4.4	2.8		

Table 2. Self-Reported Alcohol-Related Problems of Participants in the Battalion Alcohol Skills Intervention Curriculum Evaluation, 1998-1999

Problem	Control Group ($n = 409$) Baseline (%)	Control Group ($n = 409$) 6-Month Follow-Up (%)	Control Group ($n = 409$) Proportion of Change (%)	Intervention Group ($n = 158$) Baseline (%)	Intervention Group ($n = 158$) 6-Month Follow-Up (%)	Intervention Group ($n = 158$) Proportion of Change (%)	χ^2 or F	p
Got drunk from alcohol	61.5	46.5	-24.4	64.3	40.3	-37.3	7.57	0.006
Inability to remember things while drinking	47.1	33.8	-28.2	45.7	25.6	-44.0	10.63	0.001
Couldn't stop drinking before becoming drunk	35.6	24.8	-30.3	31.3	16.4	-47.6	11.59	<0.001
Serious consequences resulting from alcohol	19.9	13.6	-31.7	23.3	10.1	-56.7	24.42	<0.001
Hands shook after drinking	17.5	11.5	-34.3	16.3	12.4	-23.9	4.58	0.032
Drank alcohol first thing in the morning	19.0	11.2	-41.1	18.8	9.4	-50.0	3.36	0.067
Productivity loss resulting from alcohol	27.1	11.1	-59.0	32.6	14.0	-57.1	0.11	0.744
Became nauseated after drinking	44.3	30.2	-31.8	45.7	30.2	-33.9	0.20	0.654
Hit someone in a fight after drinking	22.3	9.1	-59.2	21.9	7.8	-64.4	0.28	0.598
Number of alcohol–related problems reported (out of 9 listed items) [Mean (*SD*)]	2.41 (2.70)	1.61 (2.21)	-	2.46 (2.56)	1.36 (1.94)	-	1.51	0.220

Note: The proportion of change was compared between the control and intervention groups using a chi-square test. Items in this table were collected only at baseline and the 6-month follow-up survey.

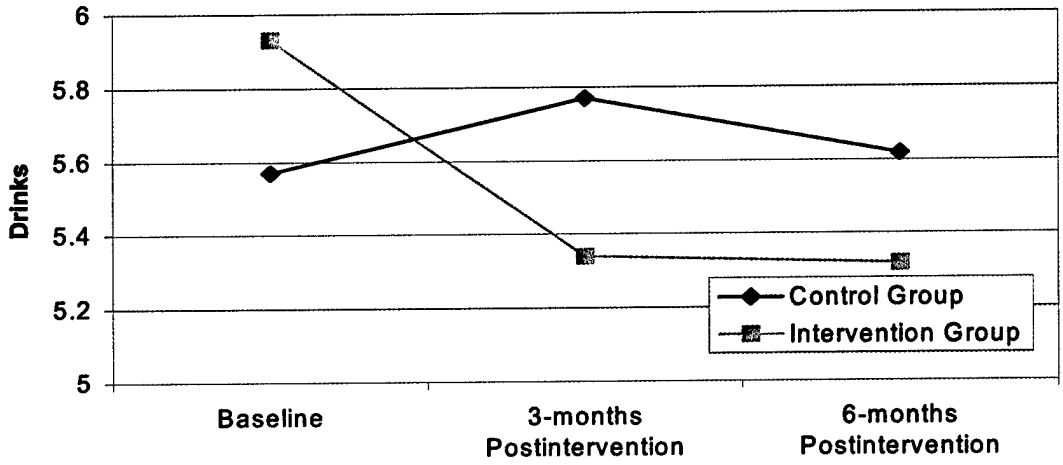

Figure 1. Average drinks per day of participants in the Battalion Alcohol Skills Intervention Curriculum evaluation, 1998-1999.

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14. ABSTRACT (maximum 200 words):

The objective of this study was to evaluate the effect of an alcohol misuse prevention program on drinking behavior and alcohol-related problems among United States Marine Corps personnel. A total of 567 men from two Marine Corps infantry battalions participated in the evaluation in which members of one battalion received an alcohol misuse prevention program, while members of the second battalion served as controls. The program consisted of targeted, small-group training sessions, with corporals and sergeants training their subordinates. Subjects completed questionnaires on alcohol use behavior at baseline and at 3- and 6-months postintervention. Alcohol-related legal incidents, alcohol abuse counseling referrals, and other outcomes were measured in aggregate. This study found that there was a greater decrease in the percentage of some self-reported alcohol-related problems, including serious consequences resulting from alcohol and specifically in blacking out, not being able to stop drinking, and getting drunk from alcohol among the intervention group compared with the control group. There was a small decrease in the number of drinks per day at the 3-month follow-up and in the rate of counseling referrals among the intervention group. No differences were observed in the Alcohol Use Disorders Identification Test score, drinking days per month, or in the other outcomes. The results suggest that the alcohol reduction training program did not have a significant overall effect on drinking behavior, however, the program may have prompted a short-term decrease in drinking and affected some alcohol-related problems.

15. SUBJECT TERMS
alcohol, alcohol use, heavy drinking, alcohol-related problems, military, prevention, education

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